

Claims

- [c1] A pre-crash sensing system for a vehicle, comprising:
at least one sensor for detecting at least one object located external to the vehicle; and
a controller coupled to said at least one sensor and intended to selectively generate an identification list and an object classification list, said object classification list for transmission to a safety countermeasure system.
- [c2] The pre-crash sensing system as recited in claim 1 wherein said at least one sensor is utilized for detecting at least one parameter of said at least one object, said at least one sensor transmitting said at least one parameter to said controller, said controller selectively processing said at least one parameter to generate said object identification list and said object classification list.
- [c3] The pre-crash sensing system as recited in claim 2 wherein at least one parameter includes at least one of a height, a width, a depth, a range, a range rate, an angle, and a visual feature.
- [c4] The pre-crash sensing system as recited in claim 1 wherein said at least one sensor includes at least one of

a visual-imaging camera and an electro-magnetic wave-ranging device.

- [c5] The pre-crash sensing system as recited in claim 1 wherein said at least one sensor includes both said visual-imaging camera and said electro-magnetic wave-ranging device.
- [c6] The pre-crash sensing system as recited in claim 4 wherein said visual-imaging camera is selected from the group consisting of a monocular camera and a binocular camera.
- [c7] The pre-crash sensing system as recited in claim 4 wherein said electro-magnetic wave-ranging device is selected from the group consisting of a radar device, a lidar device, and a stereo camera pair ranging device.
- [c8] The pre-crash sensing system as recited in claim 2 wherein said controller comprises:
 - an object-tracking module for storing said object identification list and said object classification list, said object identification list including a plurality of identities of previously detected objects as defined by a plurality of archived parameters;
 - a process-determining module coupled to said object-tracking module and said at least one sensor, said pro-

cess-determining module for receiving said object identification list from said object-tracking module and receiving said at least one parameter from said at least one sensor, said process-determining module for determining that said object is a previously undetected object; and

an object-classifying module coupled to and actuated by said process-determining module, said object-classifying module for identifying said at least one object and updating said object identification list stored in said object-tracking module, said object-classifying module for classifying said object into a predetermined category and updating said object classification list stored in said object-tracking module.

- [c9] The pre-crash sensing system as recited in claim 2 wherein said controller comprises:
- an object-tracking module for storing said object identification list and said object classification list, said object identification list including a plurality of identities of previously detected objects as defined by a plurality of archived parameters;
 - a process-determining module coupled to said object-tracking module and said at least one sensor, said process-determining module receiving said object classification list from said object-tracking module and receiv-

ing said at least one parameter from said at least one sensor, said process-determining module for determining that said at least one object is a previously unclassified object; and
an object-classifying module coupled to and actuated by said process-determining module, said object-classifying module for classifying said object into a predetermined category and updating said object classification list stored in said object-tracking module.

- [c10] The pre-crash sensing system as recited in claim 2 wherein said controller comprises:
an object-tracking module for storing said object identification list and said object classification list, said object identification list including a plurality of identities of previously detected objects as defined by a plurality of archived parameters;
a process-determining module coupled to said object-tracking module and said at least one sensor, said process-determining module receiving said object classification list from said object-tracking module and receiving said at least one parameter from said at least one sensor, said process-determining module for determining that said at least one object requires an updated classification; and
an object-classifying module coupled to and actuated by

said process-determining module, said object-classifying module for classifying said object into a predetermined category and updating said object classification list stored in said object-tracking module.

- [c11] A method for operating the pre-crash sensing system for a vehicle recited in claim 1, comprising:
utilizing at least one sensor for detecting at least one object located external to the vehicle;
producing a queue of said at least one object; and
individually determining that each of said at least one object requires that an object classification is updated, said object classification list being stored in a controller.
- [c12] The method as recited in claim 11 wherein utilizing said at least one sensor comprises:
utilizing at least one of a visual-imaging camera and an electro-magnetic wave-ranging device for detecting at least one of a height, a width, a depth, a range, a range rate, an angle, and a visual feature associated with said at least one object.
- [c13] The method as recited in claim 11 wherein individually determining that each of said at least one object requires that said object classification list is updated comprises:
determining that each of said at least one object has been previously classified.

- [c14] The method as recited in claim 11 wherein individually determining that each of said at least one object requires that said object classification list is updated comprises: determining that said at least one object is associated with an outdated classification.
- [c15] The method as recited in claim 11 further comprising: transmitting said object classification list to a safety countermeasure system of the vehicle.
- [c16] A method for operating the pre-crash sensing system for a vehicle recited in claim 1, comprising:
utilizing at least one sensor for detecting at least one object located external to the vehicle;
producing a queue of said at least one object; and
individually determining that each of said at least one object requires that at least one of an object identification list and an object classification list is updated, said object identification list and said object classification list being stored in a controller.
- [c17] The method as recited in claim 16 wherein utilizing said at least one sensor comprises:
utilizing at least one of a visual-imaging camera and an electro-magnetic wave-ranging device for detecting at least one of a height, a width, a depth, a range, a range

rate, an angle, and a visual feature associated with said at least one object.

[c18] The method as recited in claim 16 wherein individually determining that each of said at least one object requires that said object classification list is updated comprises: determining that each of said at least one object has been previously unclassified.

[c19] The method as recited in claim 16 wherein individually determining that each of said at least one object requires that said object classification list is updated comprises: determining that said at least one object is associated with an outdated classification.

[c20] The method as recited in claim 16 further comprising: storing at least one of an updated object identification list and an updated object classification list in an object-tracking module within said controller at the end of an image processing cycle.